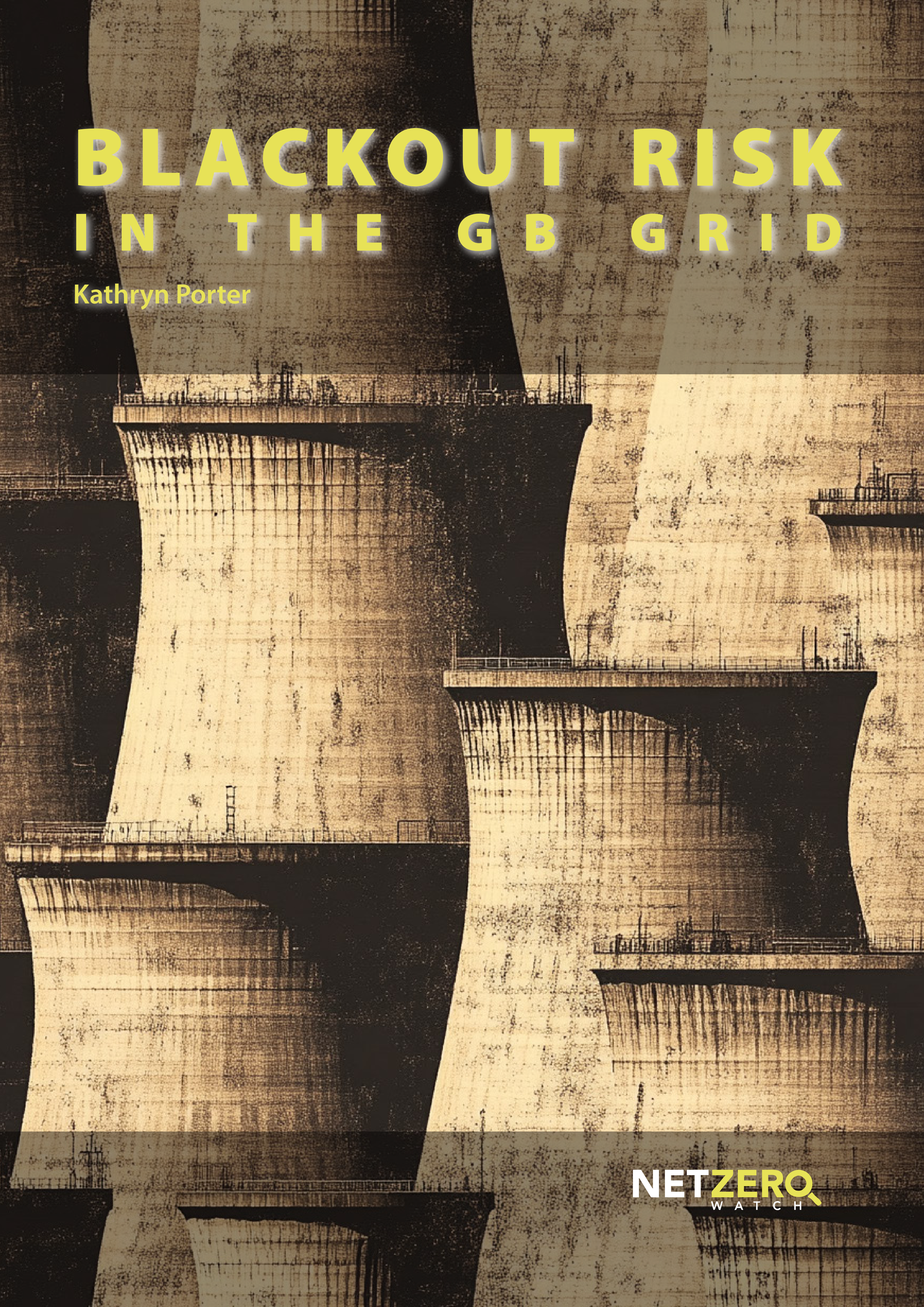
BLACKOUT RISK IN THE GB GRID

Kathryn Porter



NET ZERO WATCH

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About the author

Kathryn Porter is an independent energy consultant, with broad experience of the energy and finance sectors in both leadership and technical roles. She has specific expertise in the utilities, oil and gas sectors, with finance experience spanning equities and equity derivatives, debt capital markets, M&A, loans, and risk management.

Currently running her own consulting business, Watt-Logic, Kathryn advises clients across the energy value chain on the opportunities and risks arising from the energy transition. This includes analysis of investment opportunities in generation and storage, devising procurement and risk management strategies for buyers of gas and electricity, advising on commercial contracts, such as offtake and power purchase agreements, and helping clients to understand the impact of regulatory and market change on their businesses. Kathryn has also acted as an expert on a matter relating to cross-border energy trading.

Before starting her business, Kathryn held various energy structuring and hedging roles at Centrica, Société Générale, EDF Trading, and at Barclays Capital, where she moved into commodities after starting in a fixed income role. Prior to this she worked in the Capital Markets & Advisory division at Commerzbank and in the financial services audit practice at Deloitte.

Kathryn holds a Master's degree in physics from the University of Exeter and an MBA from London Business School. She is a Chartered Fellow of the Chartered Institute for Securities and Investments and is a member of the Institute of Directors. She is an associate member of the Executive Council for the All-Party Parliamentary Group for Energy Studies.

Executive summary

The risk of blackouts in the Great British electricity market was brought home on 8 January 2025 during the tightest day since 2011. The spare margin – the surplus generation capacity available to meet demand – fell to worryingly low levels, with a real risk of demand control or even a blackout. Demand control is when the National Energy System Operator (NESO) decides to disconnect some regions of the country in order to prevent a nationwide blackout.

This is not the only incident this winter, but it is by far the most serious. On 14 October 2024, the grid saw the first 'Capacity Market Notice' in two years (there were further such notices on 3 December 2024 and 8 January 2025). This was despite NESO determining in its *Winter Outlook*[1] that the spare capacity margin for this winter would be higher than in recent years.

> 'The current Base Case de-rated margin is 5.2 GW [gigawatts] (representing 8.8% of peak cold spell demand). The associated loss of load expectation (LOLE) is below 0.1 hours. This is higher than the 4.4 GW (7.4%) published in the Winter Outlook Report for 2023/24 and remains comparable to the *Early View* published in June. The higher year-on-year margin is driven by new interconnection, growth in battery storage capacity and an increase in generation connected to the distribution networks. In combination, these changes more than offset generation retirements and other temporary capacity reductions.'
>
> \- *National Energy System Operator*

A Capacity Market Notice is issued when it is deemed that the spare generation capacity available, over expected demand, falls below 0.5 GW. In order to resolve the market tightness on 8 October 2024, NESO was obliged to procure up to 5 GW of capacity over the interconnectors, at a cost of around £13 million. On 8 January 2025, it was even more expensive to keep the lights on, with more than £21 million being spent on so-called 'balancing actions'. On the same day, there were also three 'Electricity Margin Notices', which are issued when the market is tight, as a warning that special measures may be needed to secure the system.

On 8 October, 28 October and 20 November 2024 'frequency events' were triggered, when large interconnectors (import/export cables) unexpectedly stopped flowing, leading to NESO's operating frequency tolerance being breached.[2] More worryingly, recent years have seen frequency drift outside these operational limits hundreds of times a year, even without the loss of a major source of supply like a generator or an interconnector.

In addition, there was an extended period of 'dunkelflaute' in early November,[3] where renewable generation was minimal and the country relied on large amounts of gas-fired generation to meet demand. It lasted for five days, far longer than the capacity of any batteries available in Great Britain to operate. Cutting edge chemical batteries, which are not yet operational, may last for 100 hours – the average of the current fleet of GB batteries is around 1.5–2.0 hours. Other technologies, such as pumped hydro, have the capacity to run for longer, but GB lacks the geography to build enough of these facilities to cover a dunkelflaute. Dinorwig, Europe's largest pumped hydro power station, located in Wales, has the ability to run for five hours.[4]

As the energy transition progresses, and the Government pushes on to its *Clean Power 2030* (CP2030) ambition, the risk of blackouts will rise. The risks become significant from the winter of 2027–28 onwards, as nuclear retirements and a push to replace conventional gas generation with intermittent wind and solar, alongside possible effects of electrification, stress the electricity grid, potentially to breaking point.

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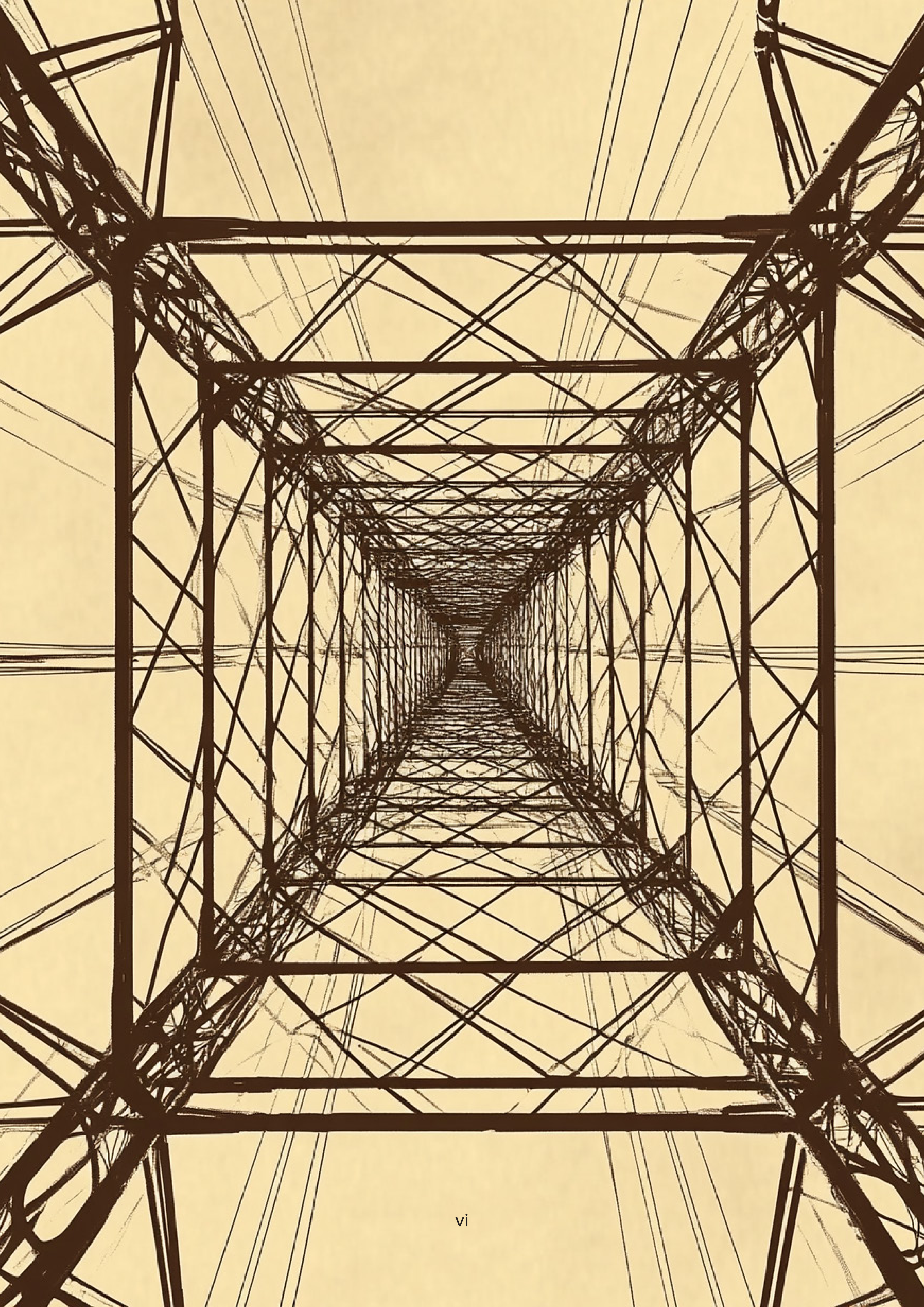
1 https://www.neso.energy/publications/winter-outlook.

2 It is critical for grid stability that the entire system operates at (or very close to) a frequency of 50 Hertz.

3 The term means literally 'dark doldrums' – in other words a period of very low (or zero) wind and solar output.

4 https://www.fhc.co.uk/en/power-stations/dinorwig-power-station/.



Possible causes of blackouts

Blackouts can have two main causes. The first and most common is a grid fault, while the second is a lack of available generation capacity to meet demand.

The operation of grids is a function of the basic physics of electricity generation, and the relationship between supply and demand for power. Modern grids, such as the one in GB, operate on alternating current; that is, current and voltage vary with time with a predictable, smooth wave pattern, with a frequency of 50 Hz (i.e. 50 wave cycles per second). If there is more generation than demand, the frequency will increase, and if there is more demand than generation, the frequency will fall (Figure 1). Electrical equipment is very sensitive to this frequency, and many components of the grid, from generators to substations, will self-disconnect should their operational tolerances be breached.

The last two blackouts affecting large parts of the country were caused by lightning strikes on the network, which led large sources of generation to disconnect, resulting in a rapid drop in grid frequency as demand suddenly exceeded available generation. The margin of the shortfall was so large that it exceeded the ability of the system operator to correct it, for example by instructing backup to replace the generation lost through the lightning strike.

Discrepancies between generation and demand can also be caused by other factors. As the proportion of weather-based renewables increases, generation becomes more variable in real time as a result of momentary changes in the weather. For example, passing clouds can have a measurable impact on solar output, and individual gusts of wind can affect wind output. As more sources of generation exhibit such variability, it becomes increasingly difficult for the system operator to ensure that grid frequency remains within operational limits at all times. In addition, the use of interconnectors is growing, but these tend to be large 'lumps' of input electricity, and so they make the grid more vulnerable – if they trip off for any reason, there can be a large and sudden reduction in supply.

The other main reason for blackouts is when there is insufficient generation (in a more 'macro' sense) to meet demand. Again, as conventional generation is displaced by wind and solar, there is a growing risk that on days when renewable output is low, there will be inadequate backup to fill the gap. In 2017, the Government introduced the Capacity Market to mitigate this risk – conventional generators, batteries and end users are paid to make additional electricity available or cut demand in the event of 'system stress'; that is, times when otherwise there would be insufficient generation to meet demand. To date there has not been a system stress event, but the risk is growing with the displacement of conventional generation by weather-based renewables.

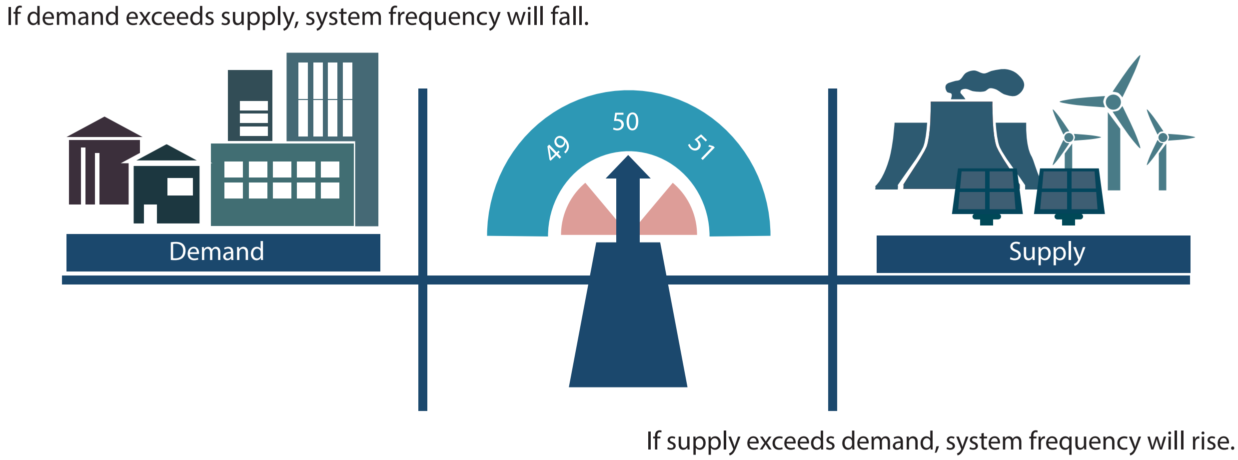


Figure 1: Typical generation mix on a low-wind day in winter

Today's energy system

Dependence on gas

Britain's energy system is heavily dependent on methane ('natural gas'[5]). Gas-fired power stations dominate the electricity system, and 74% of homes rely on mains gas for heating.[6] Gas is also widely used in industrial applications, particularly in those requiring high-temperature heat (above 1,000°C).

Transition to renewables

Since the end of the last century, Britain has aggressively encouraged renewables – primarily wind power, but also solar – through the extensive use of subsidies. In addition, there has been a move to increase the connectivity of the GB electricity market with its neighbours, through the construction of additional cross-border power cables ('interconnectors'). These are deemed to deliver zero-carbon electricity irrespective of the actual generation mix of the supplying country – something which could reasonably be considered greenwashing. Indeed, the BritNed interconnector with the Netherlands displaced a proposed gas-fired power station in Britain but was supplied by a gas fired power station located close to the landing point of the cable in the Netherlands.

The term 'renewable generation' incorporates more than just wind and solar – there is also hydro power, geothermal energy, tidal energy and other sources. However, Britain lacks the geology and geography for extensive hydro and geothermal installations, and to date, it has proved very difficult to economically harness tidal power. This means that in Britain, the use of renewables is dominated by wind and solar.

The great difficulty with wind and solar power is that they are dependent on the weather, which is notoriously difficult to predict, particularly beyond a few days into the future, and is highly variable. Today, wind output can vary from less than 1 GW to more than 15 GW. On 22 January 2025 it fell below 0.1 GW! It is also important to note that solar power does not contribute to energy security since the periods of peak electricity demand during the year occur after sunset in winter. Even during the day in winter, solar can be minimal, as illustrated in Figure 2.

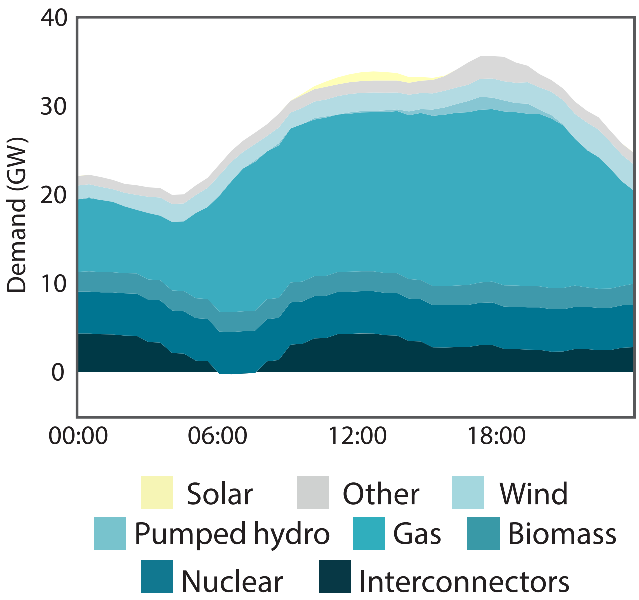


Figure 2: Typical generation mix on a low-wind day in winter

Source: BMRS, Sheffield Solar, Watt-Logic

Such swings in the output of renewable generation are very difficult to manage, and it is necessary to ensure that backup generation, batteries or 'demand-side response' (end users who can either contribute backup generation to the grid or reduce consumption) are available to meet any shortfalls.

There is another important challenge associated with the replacement of conventional generation with intermittent renewables. Conventional generators, such as gas turbines, not only create the 50-Hz grid frequency (by rotating in synchronicity at 3,000 revolutions per minute), they also resist changes to their speed of rotation due to their large size and weight. This resistance to change is called 'inertia', and

5 The term 'natural gas' is frequently used to describe methane, however many other gases occur naturally so this moniker is somewhat misleading. For example, both carbon dioxide and hydrogen are naturally occurring gases.

6 https://commonslibrary.parliament.uk/research-briefings/cbp-9838/.

the presence of all these large gas and nuclear turbines on the grid makes the system as a whole more resilient in the face of any pressures that might otherwise drive the frequency to change, such as the large variations in supply from wind and solar.

However, as gas and nuclear turbines are replaced by wind and solar, inertia is reduced. Wind and solar produce direct current, which is converted to alternating current using electronic devices that simply do not work when the grid frequency is outside certain operational limits. This means that not only do wind and solar not contribute to creating the 50 Hz frequency, they can quickly undermine it, either by injecting highly variable inputs or by disconnecting themselves when the frequency falls outside their operational bands. The effect is to make grid frequency more variable, and harder (and more expensive) to control.

Growing challenge of grid frequency

Britain's national energy system operator (NESO) has a statutory duty to maintain grid frequency at 50 Hz±1%. It also has an operational range, which it may only exceed for 1500 minutes per year, of ±0.4%. It is surprising to see how often the operational limits are breached. Moreover, in December 2023, the *statutory* limit was breached, although with little fanfare (Figure 3).

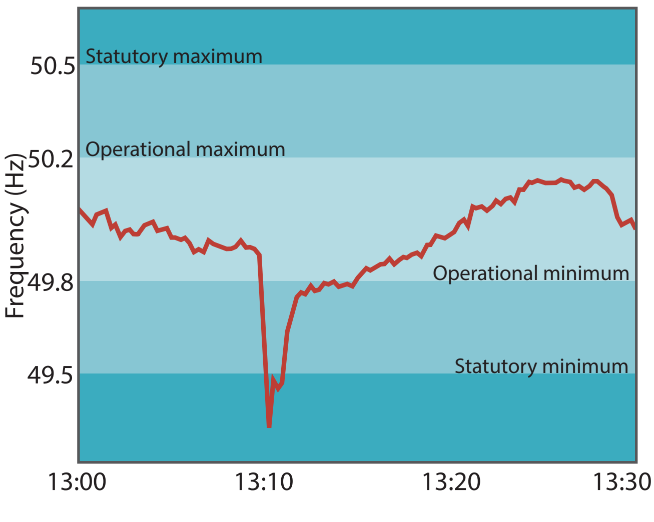


Figure 3: System frequency, 22 December 2023

Source: BMRS

According to NESO,[7] the reasons for this event were trips on an interconnector and a gas-fired power station.[8] There was a simultaneous co-incidental outage on a high-voltage line in Scotland.[9]

Typically, the market notices frequency excursions that result from major outages. In the first two months of Winter 2024–25, there were major trips of the NSL and Viking interconnectors, both of which sent frequency tumbling. A near-simultaneous outage of the IFA2 interconnector and the Langage gas-fired power station had a similar impact. However, most excursions are not caused by trips but by a gradual upward or downward drift in grid frequency, which is arguably more concerning.

In the past four years, the upper operational limit was breached around 500 times in each winter season, but in 2017–2019 the number was higher (Figure 4). The lower limit has tended to be breached less often – 2022/23 was an outlier with a very high number of breaches.

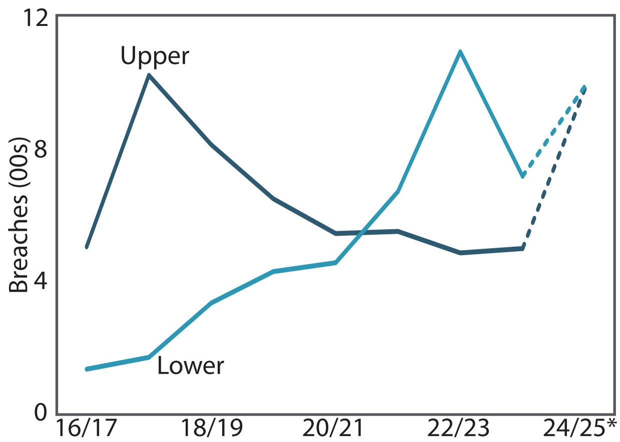


Figure 4: Grid frequency breaches

*Scaled up from first half of winter.
Source: NESO, Watt-Logic

7 https://www.neso.energy/document/299266/download.

8 The 1000-MW IFA Bipole 1and 383-MW Cottam respectively.

9 The Caithness-Moray HVDC link.

However, the number of such breaches has also been growing steadily, which is consistent with falling grid inertia (see Figure 5) and a perception that the grid is becoming less reliable.

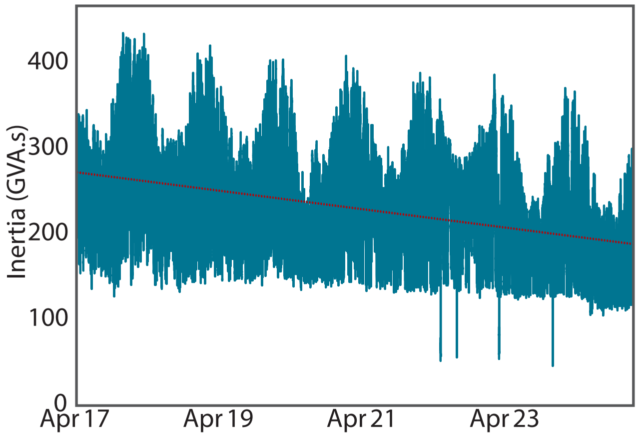


Figure 5: GB grid inertia

Trend: $y = -0.0291x + 1510$. Source: NESO

When individual events are inspected, it is more often the case that frequency has drifted outside the operational range rather than suddenly falling out, as would be expected from an outage. This is more worrying, as it points to a general difficulty in maintaining stable frequency – things will always break and trip, and the grid is designed to deal with such events, but these drifts outside the range speak more to a wider reduction in stability.

A 0.3-Hz variation is considered significant in the NESO control room. Such events are actually quite rare, and 0.2-Hz moves are more common, but still not that typical. Even smaller moves are much more likely, as can be seen in Figure 6. There is a small trend of increasing larger jumps, but the numbers are too low for this to be considered statistically significant.

NESO is currently able to manage falling inertia, but the regularity with which frequency is drifting outside operational bounds is a cause for concern. As the energy transition progresses, this task will become increasingly difficult, and the risk of blackouts will rise. The Government has made the creation of a 'Clean Power System' by 2030 a major priority – by this it means that 95% of the generation used to meet demand across the year should come from zero-carbon sources. Managing falling inertia could become a limiting factor to this ambition, and there is a danger that in seeking to accommodate the Government's plans, NESO will allow the system to become less reliable, possibly to the extent of failure.

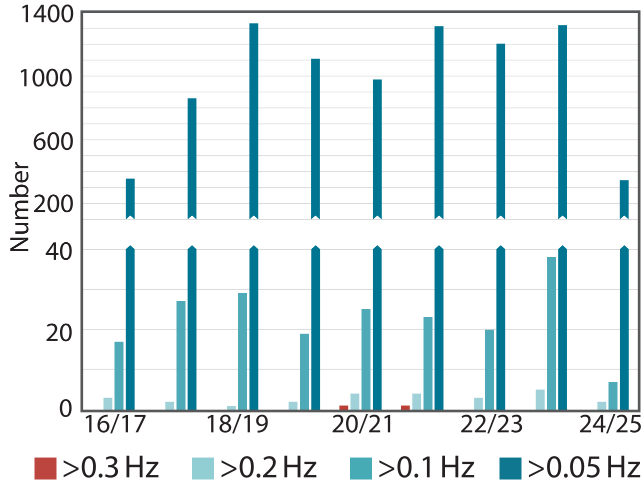


Figure 6: GB grid frequency jumps

Number of times frequency jumps by the indicated amount per Winter season over 5-s intervals. Source: NESO, Watt-Logic.

Blackout near miss on 8 January 2025

On 8 January there was very little wind generation and the availability of interconnectors was lower than expected in the *Winter Outlook*. Demand was also higher than expected, leading to a very small system margin of around 0.5 GW, plus a reserve of maybe 0.7 GW.[10] The latter figure is less than the amount that NESO is required to hold under the Security and Quality of Supply Standard (SQSS), which specifies that the reserve must be sufficient to cover the loss of the largest source of supply, whether a generator or interconnector. Currently the largest sources of supply are the NSL (Norway) and Viking (Denmark) interconnectors which each have a capacity of 1.4 GW.

NESO disputes that the grid came close to needing demand control on 8 January 2025, claiming to have always had at least 3.7 GW of

10 https://watt-logic.com/2025/01/17/nesos-approach-to-transparency/.

spare capacity,[11] but it has steadfastly refused to explain which units were available. On the day, generators were able to secure very high revenues from running in the market – around 35 times the usual price per unit of generation. Most generators (and batteries) that could run, were already running, seeking to take advantage of the high prices.

Moreover, had there been 3.7 GW of spare capacity, as NESO claimed, it is unclear why they thought it necessary to issue the various market notices – a Capacity Market Notice is only issued when the margin falls below 0.5 GW – nor why they had felt bound to pay greatly over the odds to get gas-fired units to run.

Implications of the Clean Power 2030 plan

In November, NESO published its paper setting out how it could help to deliver on Labour's *Clean Power 2030* (CP2030) ambition.[12] This was followed in December by the Government's Action Plan for delivery.[13] The plan calls for an ambitious acceleration of renewables projects (see Figure 7), with the capacity of most technologies requiring significant expansion, but with some – long-duration energy storage,[14] BECCS (bioenergy with carbon capture and storage), gas-carbon capture and storage, and hydrogen – yet to be deployed anywhere at commercial scale, and others entirely unproven.

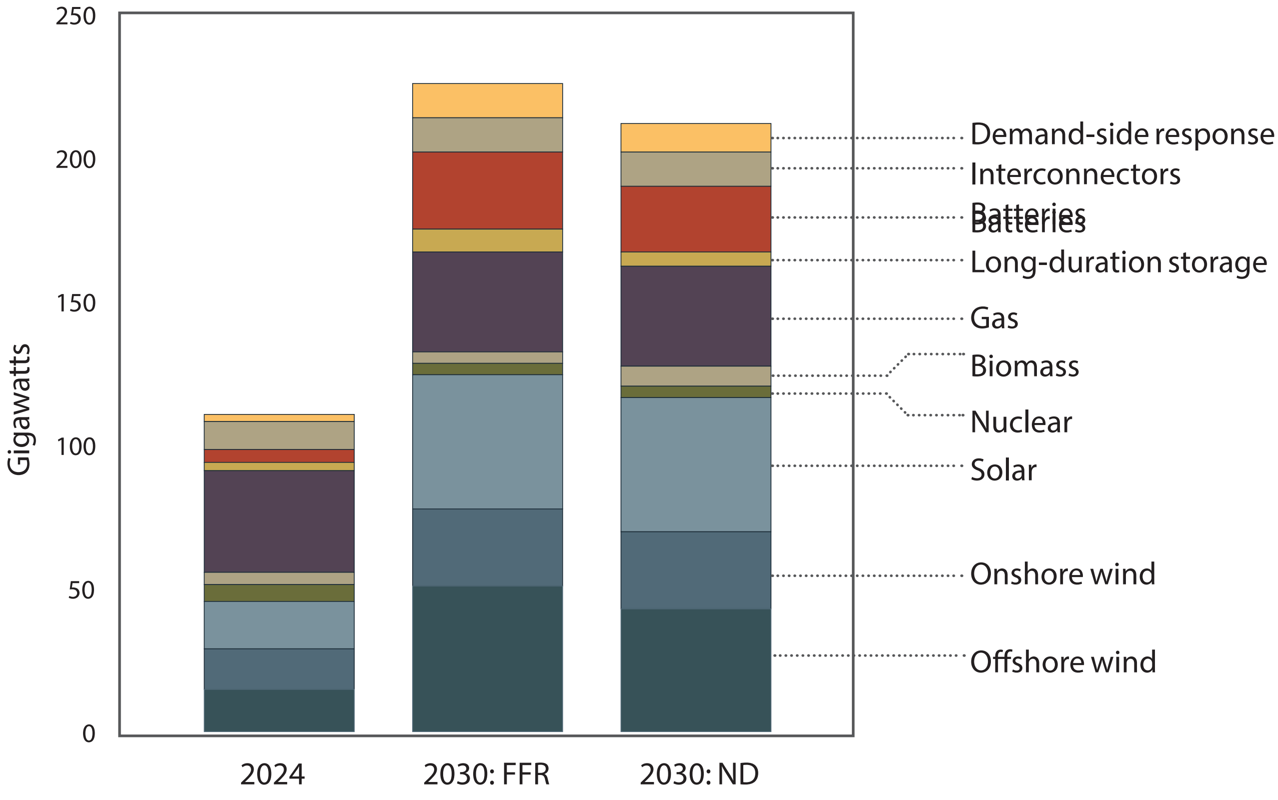


Figure 7: Capacity requirements for different CP2030 scenarios compared with current capacity

The two NESO scenarios shown are: FFR, 'Further flex and renewables' and ND, 'New dispatch'. Source: Extracted from Clean Power Action Plan, Table 1.

11 https://www.neso.energy/news/what-happened-margins-8-january.

12 https://www.neso.energy/news/our-clean-power-2030-advice-government.

13 https://www.gov.uk/government/publications/clean-power-2030-action-plan.

14 The Government includes pumped hydro, which does exist, in the category of 'long-duration' storage. This is incorrect. While pumped hydro lasts longer than chemical batteries, it can still only run for a matter of hours, and is therefore only able to partially respond to periods of low wind, which can last for days and even weeks. Genuine long-duration storage would be measured in days, weeks and months, not hours.

In addition to delivering on these new generation and storage projects, significant new grid infrastructure will be needed. NESO has said that in the next five years, twice as much transmission (high voltage) grid will need to be built as was built in the past ten!

According to NESO, unabated gas generation, which currently dominates the market, and which is essential on low-wind days, as shown in Figure 2, will only provide 5% of the country's electricity needs in an 'average year' by 2030. However, in order to ensure that demand is met and the lights stay on during those low-wind days, the entire current generating fleet (35 GW) would need to be held in reserve.

Feasibility of capacity expansion

It will clearly be challenging to increase renewable generation by the amounts shown in Figure 7. There are already some projects in the pipeline, but an increase in the subsidies available for offshore and onshore wind will also probably be required.

However, not only is financing a challenge, so too is the planning system and the process of queueing projects requiring grid connections. Reform of both is needed – in both cases requiring new legislation – in order to ensure the necessary CP2030 generation and storage projects are delivered on time. This will be highly challenging. Not only must the legislative changes be designed, they then need to be drafted, and Parliamentary time found.[15] This could take years.

Once the necessary legislative changes have been made, they will have to be implemented. The planning process involves multiple agencies, including local planning authorities, the Environment Agency, Natural England and Historic England. Different processes are followed in each of the nations of the United Kingdom. Increasing the number of projects being permitted, as well as accelerating the permitting process, will require significant additional resources. Not only will these cost money, but it is already difficult to fill vacancies in some of the agencies involved, so recruiting and training the extra staff required in the time available will be a significant challenge.

Finally, there are challenges with both supply chains and availability of skilled workers to carry out installations. For example, shortages of high-voltage power cables threaten the ability to deliver on new interconnector projects.

Feasibility of grid expansion

According to the Action Plan, approaches have been identified that would reduce grid infrastructure delivery timescales from the current fourteen years to just seven. However, that would still not be fast enough to meet the CP2030 timetable. Moreover, recent market trends suggest that lead times could increase, rather than fall, due to supply-chain issues.

Lead times for large transformers – for use in both substations and at generators – have increased to between 2 and 4 years.[16] At the same time, depending on the size and application, their prices have risen 60–80% since January 2020, driven upward by raw material commodities. For example, prices for the special steel used in their manufacture have almost doubled since the pandemic (although they are highly volatile), while copper prices have risen by more than 40%. Network operators are unlikely to order such expensive equipment until planning consent has been secured. This means that if the works are to be completed by 2030, planning permission needs to be granted well before the end of 2025, so that there is enough time for the equipment to be ordered, delivered and installed.

In any case, delivering twice as much grid infrastructure in the next five years as delivered in the previous ten is highly unlikely to happen.

Feasibility of gas reserve

The feasibility of maintaining such a large gas reserve for such few running hours is highly uncertain. A few of the physical challenges associated with very low utilisation are shown in Box 1.

15 https://publications.parliament.uk/pa/ld/ldstleg.htm.

16 https://www.powermag.com/the-transformer-crisis-an-industry-on-the-brink/.

Box 1: Physical challenges of running gas-fired power stations at low utilisation

• *Corrosion and oxidation:* prolonged idle periods can lead to corrosion of critical components, such as turbine blades, combustors, and piping, due to moisture or ambient air contaminants.

• *Gas path fouling:* even with protective measures, dust, oil, and other deposits can accumulate in the compressor and turbine sections, affecting performance during startup.

• *Fuel system issues:* long periods of inactivity can lead to clogging, varnish buildup, or microbial growth in fuel storage and delivery systems, especially in older systems without advanced filtration.

• *Start-up reliability:* ensuring the turbine starts reliably after long periods of dormancy requires rigorous maintenance of ignition systems, control systems, and auxiliary equipment.

• *Lube oil degradation:* lube oil can degrade or develop moisture contamination over time, leading to improper lubrication of bearings during startup.

• *Sealing systems:* mechanical seals, especially in older designs, may dry out or degrade during periods of inactivity, potentially causing leaks.

• *Rotor bowing:* prolonged stationary periods can result in rotor bowing due to uneven cooling or settling, especially in older turbines. This can cause vibration issues when restarting.

• *Thermal insulation degradation:* heat retention systems such as insulation blankets can deteriorate during long idle periods, affecting thermal cycling stability upon restart.

• *Battery and electronics failure:* auxiliary systems (including control system batteries, sensors, and actuators) may fail due to inactivity, requiring replacement or recalibration before restart.

• *Preservation of rotating equipment:* extended dormancy requires specific preservation strategies, such as turning the turbine manually to prevent rotor bowing, using desiccant systems to maintain dryness, or nitrogen blanketing to avoid oxidation.

• *Preservation of heat recovery steam generators ('HRSGs') and auxiliary systems:* HRSGs can suffer from corrosion in idle periods if proper lay-up procedures (wet or dry preservation) are not rigorously followed. Auxiliary equipment such as pumps and valves may seize up if not exercised periodically.

Some of these issues can be mitigated by the implementation of robust preservation plans, involving, for example, the use of nitrogen blanketing or dehumidifiers. In addition, enhanced inspection and monitoring would be advised, including non-destructive testing for key components, and advanced monitoring systems, such as vibration analysis and thermal imaging, to identify degradation before failures occur. Many of these processes would involve cost, and the use of additional equipment (e.g for nitrogen blanketing and component testing/imaging).

There are also staffing challenges. In addition to staff running the plant, expert support staff are needed to ensure the plant operates reliably. This includes an experienced grid compliance engineer, a pressure-parts assurance engineer with perhaps 30 years' steam-plant experience, and a generator expert.

However, careers in fossil fuels are no longer appealing to many young people, who see gas generation as an industry in decline – and not unreasonably so, against the background of the Government's stated ambition to minimise its use. However, as NESO makes clear, gas-fired power stations will be required as a backup for renewables for at least the next decade, so the industry needs to keep recruiting talent. It would be hard to maintain the fleet with existing staff given expected retirements, and the increasing difficulty of replacing them will undermine the reliability of the fleet.

Obviously, there would also be economic challenges to keeping such a large fleet of gas power stations in reserve for use in the small number of hours expected. The Government has indicated it will use existing market frameworks to ensure they are financially incentivised to remain open and ready for use. This means using the Capacity Market, which is designed to ensure sufficient generation, as well as other measures, such as:

- imports
- batteries
- demand-side response (either use of behind-the-meter generation or reductions in consumption).

However, gas generators would probably require much higher prices than are currently available in the Capacity Market (to reflect the higher costs of maintaining their plant due to the very low expected running hours). Moreover, the price achieved in the capacity auctions are paid to all successful auction participants, so this would mean paying higher prices to everyone, not just the gas generators (i.e. the interconnectors, batteries and demand-side response providers as well). This will significantly increase costs to consumers.

Impact of failing to deliver

Unfortunately, the consequences of failing to deliver on the new generation and other infrastructure outlined in the Action Plan has consequences beyond simply having to run existing gas-fired power stations more often.

The first challenge relates to retirement of existing generation. While the Government recognises that two of the existing nuclear reactors will close before 2030, two more are set to close in 2030. However, in the Action Plan the latter are counted towards the market capacity in that year. NESO assumes the first unit of the new nuclear power station at Hinkley Point C will open by 2030, but this is very unlikely based on progress to date (the Government is more circumspect). Based on current, more realistic projections, only one nuclear power station will be running in 2030: Sizewell B. This reduces the likely available generation by 2.8 GW.

In addition, some gas plant is likely to close. Parts of the fleet are aging, and experience indicates that gas-fired power stations rarely run for longer than their 25–30-year design life. With much of the fleet having been commissioned in the late 1990s and early 2000s,[17] they are already pushing the limits of their operating lifetimes. The costs of maintaining them against an expectation of much lower running hours may be considered unattractive by operators, who may opt to close them rather than carry out the necessary work to place them into the

17 https://en.wikipedia.org/wiki/List_of_active_natural_gas_power_stations_in_the_United_Kingdom.

proposed gas reserve. This could reduce the available capacity by tens of gigawatts in the worst case scenario.

The availability of interconnectors is also at risk. In recent years, both gas and electricity interconnectors in Europe have been subject to both accidental damage and what appears to be deliberate sabotage. The UK has not been immune to these issues, with an extended outage on the IFA interconnector with France following accidental damage caused by a ship's anchor in 2016. More recently, the interconnector between Finland and Estonia suffered similar damage, but this is thought to have been sabotage. Increases in energy nationalism are also being observed: Norway has twice amended its Energy Act to ensure it has the powers to restrict electricity exports to protect its domestic market. Other countries are likely to do the same thing if their own supplies are at risk, and since many of the markets with which Great Britain is connected have also pursued wind power and share similar weather, they may encounter low-wind conditions and therefore shortages at the same time. This significantly reduces the ability of interconnectors to contribute to security of supply.[18]

A further danger is that while the Government can, to a certain extent, incentivise the construction of new renewable generation by increasing the levels of subsidies on offer, it has very little ability to accelerate construction of the necessary grid infrastructure, whose supply chains are almost entirely located outside of the UK. It is therefore possible that large amounts of new generation will be constructed and either not be connected to the grid, or suffer from high levels of curtailment, which occurs when there is not enough grid capacity to move the electricity to the places it is needed. Instances of both have been increasing in recent years. For example, Drax has a capacity contract for Winter 24–25 for three gas plants. However, although they have been built, they are not running since they are not yet connected to the grid. Moreover, recently-opened windfarms have been experiencing high levels of curtailment, because the electricity they generate cannot be transported to demand centres. Consumers could therefore face the costs of building this new generation capacity but fail to realise the benefits in terms of actual new electricity being generated.

All of this presents real dangers to security of supply, even if demand does not increase in line with plans to electrify heating and transport. Fortunately for electricity consumers, these policies are currently behind schedule, with take-up slower than policymakers hoped. Should these plans be accelerated, it will result in further stress to the power grid as 2030 approaches.

Conclusion

The GB electricity grid is already facing stresses towards the end of this decade from retirements of nuclear and gas generation, as well as the growing difficulties with managing grid stability as the proportion of intermittent renewable generation increases. However, the highly ambitious *Clean Power 2030* plan magnifies these dangers significantly. Gas plant retirements could be accelerated, and even if new renewables are built, they do not work when it's not windy or sunny, and the grid infrastructure to ensure they can be fully utilised is very unlikely to be completed on time. The country is not sleep-walking into a security of supply disaster – under CP2030, it is running headlong into it.

18 https://www.thegwpf.org/content/uploads/2024/09/Porter-Interconnectors.pdf.

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